WHAT IS CLAIMED IS:

1. A liquid film forming method of dropping a liquid adjusted to be spread into a give amount on a substrate to be processed from a dropping nozzle or dropping nozzles of a dropping unit onto the substrate, and then moving the dropping unit and the substrate relatively while keeping the liquid dropping on the substrate, so as to form a liquid film on the substrate,

wherein the relative movement of the dropping unit and the substrate is composed of straight movement along a file direction in which the dropping unit passes from one end side of the substrate through an upper space of the substrate to the other end side of the substrate, and movement along a rank direction outside the substrate,

movement length along the file direction is the sum of dropping length (L) over the substrate and distance of an acceleration/deceleration section, and

movement speed (v) along the file direction over the substrate is defined dependently on the square root of the product of the dropping length (L) and the absolute value of acceleration/deceleration (a) within the acceleration/deceleration section.

2. The liquid film forming method according to claim 1, wherein dropping amount (W) from the dropping nozzle or the dropping nozzles of the dropping unit

positioned over the substrate is defined dependently on an amount proportional to the movement speed (v).

3. The liquid film forming method according to claim 1, wherein the dropping unit has plural dropping nozzles and the dropping amount (W) is the total amount of the liquid dropped from all of the dropping nozzles.

4. The liquid film forming method according to claim 1, wherein the liquid is any one selected from an antireflection material, a resist material, a low dielectric material, an insulating material, a wiring material and a metal paste.

5. The liquid film forming method according to claim 1, wherein the liquid film is formed, using the liquid having a nature that when a minute amount of the liquid is dropped onto a minute area of the substrate, a change amount of a contact angle of the liquid to the substrate is within ±2 degrees during a time from 5 seconds to 60 seconds after the dropping of the liquid.

6. A liquid film forming method of dropping a liquid adjusted to be spread into a give amount on a disc-shaped substrate which is to be processed and has a diameter (D) has from a dropping nozzle or dropping nozzles of a dropping unit above the substrate, and then moving the dropping unit and the substrate relatively while keeping the liquid dropping on the substrate, so as to form a liquid film on the substrate,

wherein the relative movement of the dropping unit and the substrate is composed of straight movement along a file direction in which the dropping unit passes from one end side of the substrate through an upper space of the substrate to the other end side of the substrate, and movement along a rank direction outside the substrate, and

movement speed (v) along the file direction is defined dependently on the square root of the product of constant 0.4, the diameter (D) of the substrate, and the absolute value of acceleration/deceleration (a) before and after the time when the movement speed (v) is given.

7. The liquid film forming method according to claim 6, wherein dropping rate amount from the dropping nozzle or the dropping nozzle of the dropping unit over the substrate is constant.

8. The liquid film forming method according to claim 6, wherein the dropping unit has plural dropping nozzles and the dropping amount is the total amount of the liquid dropped from all of the dropping nozzles.

9. The liquid film forming method according to claim 6, wherein the liquid is any one selected from an antireflection material, a resist material, a low dielectric material, an insulating material, a wiring material and a metal paste.

10. The liquid film forming method according to

claim 6, wherein the liquid film is formed, using the liquid having a characteristic that when a minute amount of the liquid is dropped onto a minute area of the substrate, a change amount of a contact angle of the liquid to the substrate is within ±2 degrees during a time from 5 seconds to 60 seconds after the dropping of the liquid.

11. A liquid film forming method of dropping a liquid adjusted to be spread into a give amount on a substrate to be processed from a dropping nozzle or dropping nozzles of a dropping unit onto the substrate, and then moving the dropping unit and the substrate relatively while keeping the liquid dropping on the substrate, so as to form a liquid film on the substrate,

wherein the relative movement of the dropping unit and the substrate is composed of straight movement along a file direction in which the dropping unit passes from one end side of the substrate through an upper space of the substrate to the other end side of the substrate, and movement along a rank direction outside the substrate, or is composed of spiral movement in which the dropping unit goes from the substantial center of the substrate to the periphery thereof or from the periphery of the substrate to the substantial center thereof, and

a change amount of a contact angle of the liquid

to the substrate is within ±2 degrees during a time from 5 seconds to 60 seconds after the dropping of the liquid when a minute amount of the liquid is dropped onto a minute area of the substrate.

12. The liquid film forming method according to claim 11, wherein control of the change amount of the contact angle of the liquid dropped onto the substrate to the substrate within ±2 degrees is attained by adjusting the ratio of a surfactant to a solvent and an application agent constituting the liquid.

13. A liquid for application used in a liquid film forming method of dropping the liquid adjusted to be spread into a give amount on a substrate to be processed from a dropping nozzle or dropping nozzles of a dropping unit onto the substrate, and then moving the dropping unit and the substrate relatively while keeping the liquid dropping on the substrate, so as to form a liquid film on the substrate,

comprising a solvent, an application agent, and a surfactant,

wherein the ratio of the surfactant to the solvent and the application agent is adjusted in such a manner that when a minute amount of the liquid is dropped onto a minute area of the substrate, a change amount of a contact angle of the liquid to the substrate is within ±2 degrees during a time from 5 seconds to 60 seconds after the dropping of the liquid.

14. A liquid film forming method of dropping a liquid adjusted to be spread into a give amount on a substrate to be processed from a dropping nozzle or dropping nozzles of a dropping unit onto the substrate, and then moving the dropping unit and the substrate relatively while keeping the liquid dropping on the substrate, so as to form a liquid film on the substrate,

wherein the relative movement of the dropping unit and the substrate is composed of straight movement along a file direction in which the dropping unit passes from one end side of the substrate through an upper space of the substrate to the other end side of the substrate, and movement along a rank direction outside the substrate, or is composed of spiral movement in which the dropping unit goes from the substantial center of the substrate to the periphery thereof or from the periphery of the substrate to the substantial center thereof, and

a dropping area is defined in such a manner that when the liquid film is spread by its fluidity, the liquid does not extend over a boundary step of the substrate film in the edge area of the substrate.

15. A liquid film forming method of dropping a liquid adjusted to be spread into a give amount on a substrate to be processed from a dropping nozzle or dropping nozzles of a dropping unit onto the substrate,

and then moving the dropping unit and the substrate relatively while keeping the liquid dropping on the substrate, so as to form a liquid film on the substrate,

wherein the relative movement of the dropping unit and the substrate is composed of straight movement along a file direction in which the dropping unit passes from one end side of the substrate through an upper space of the substrate to the other end side of the substrate, and movement along a rank direction outside the substrate, or is composed of spiral movement in which the dropping unit goes from the substantial center of the substrate to the periphery thereof or from the periphery of the substrate to the substantial center thereof, and

relationship between the distance from a dropping start position along the rank direction to a boundary step of the edge of the substrate and that from a dropping finish position along the rank direction to the boundary step of the edge thereof is set so that the former distance is large and the latter distance is small, and the distance between an end of the liquid film along the file direction and the boundary step of the edge is set so as to gradually become smaller from the dropping start position to the dropping finish position.

16. The liquid film forming method according to

claim 15, wherein the distance between the end of the liquid film and the boundary step of the edge is decided dependently on such a distance that the liquid flows on the substrate after the dropping of the liquid on the substrate.

17. The liquid film forming method according to claim 15, wherein the distance between the end of the liquid film and the boundary step of the edge is defined as a distance that the end of the liquid film reaches the end of the substrate by flow.

18. A liquid film forming method of dropping a liquid adjusted to be spread into a give amount on a substrate to be processed from a dropping nozzle or dropping nozzles of a dropping unit onto the substrate, and then moving the dropping unit and the substrate relatively while keeping the dropped liquid on the substrate, so as to form a liquid film on the substrate,

wherein the relative movement of the dropping unit and the substrate is composed of straight movement along a file direction in which the dropping unit passes from one end side of the substrate through an upper space of the substrate to the other end side of the substrate, and movement along a rank direction outside the substrate, or is composed of spiral movement in which the dropping unit goes from the substantial center of the substrate to the periphery

thereof or from the periphery of the substrate to the substantial center thereof, and

the thickness of the liquid film is decided in the manner that the liquid film formed on the substrate flows to an extent which is substantially decided by gravitation applied to the liquid film.

19. The liquid film forming method according to claim 18, wherein the thickness of the liquid film is set to 20 μm or less.